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ABSTRACT

The rapid emergence of e-learning in business and industry has been accompanied by a number of problems when instructional design concerns are incorporated into the overall curriculum development. This paper examines two companies in two distinct geographical extremes of Shin-Ju, Taiwan and Central Florida to see if, when comparisons are made, there appear to be any issues in common to both locations and cultures. In both companies, employee training as a possible solution to the problem was addressed. It was felt that if sufficient training could be provided, the management tools already in place would be used. The Taiwan organization was provided with a curricular plan based on a new instructional design model devised through a series of formulae and matrices that, once training elements are identified, should provide management with a specific action plan. The Florida organization began its training analysis by first looking at its workforce demographics and capabilities. A first step was the provision of basic communication and mathematics skills for the line-workers. Both organizations faced training issues that impacted line-employees where communication and work-related skill assessment and development were key to their future success. Management issues accompanied the decisions as to what training needs were and the basis upon which such decisions would be made. The problems encountered by both organizations were identical while the proposed solutions differed only in their complexity. Both solutions were designed to achieve success on the part of all, with quality control being the common element. The progress made in the Florida scenario paid off with results that not only are being continued, albeit in another location, but amplified within the organization as well. A conclusion cannot be made yet in the instance of the Taiwan scenario until sufficient time elapses to test the model as proposed. (Contains 8 references.) (Author/AEF)

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Instructional Design Issues Facing E-Learning: East Meets West

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Abstract

The rapid emergence of e learning in business and industry has been accompanied by a number of problems when instructional design concerns are incorporated into the overall curriculum development.

This paper examines two distinct geographical extremes of Shin-Ju, Taiwan and Central Florida to see if, when comparisons are made, there appear any issues in common to both locations and cultures.

Background:

The first company is located in Shin-Ju, Taiwan. It is one of many diverse high tech manufacturing companies located in the Shin-Ju Science Center. The major manufactured products are computer components. Their clients range from distribution channels in Taiwan and beyond on a worldwide basis. There are several thousand employees at the Shin-Ju location, with the following workforce demographics:
Males: 60% Females: 40%
Nationality: 100 % Taiwanese
Average Employee Age: 28
Average number of years employed at the company: 1-2 years
Average education level of employees: Bachelor's degree

The second company is in Lake Mary, Florida with corporate headquarters in Germany.
There are several thousand employees located at the Lake Mary plant with the following demographics:
Males: 60% Females: 40%
Nationality: Diverse, i.e. Hispanic, American-born Caucasian, African-American, Asian, Northern European, etc. with a majority being American-born Caucasian.
Average Employee Age: 34
Average number of years employed at the company: 5-10 years
Average education level of employees: High School diploma-Two year's college
The Florida corporation has ISO 9000 Certification.

The Taiwanese company has a top-down management style that maintains stringent accountability and performance standards. Employees have a three-shift daily 24-hour production line quota that is enforced. If the production line fails to meet piecework numbers and a random sampling of quality levels exceeds a specified percentage, the line is shut down until the problem is corrected.

The Florida company tolerates a specified percentage of rework numbers and, should this number increase beyond tolerances management is on the floor investigating the cause. The management structure reflects a "Northern European" work ethic relative to stringent cleanliness, time on and off the clock, and attention to detail. It is also top down but participatory in nature.

The Issues and Statement of the Problem

In the Shin-Ju company two basic quality management tools are in place to assist in the efficient operation of the plant. These tools are: Quality Control Seven Tools (QC 7) which involves analysis of tasks related to Zero Defects, Significant Milestones, Statistical Process Control, etc. and a Failure Mode Effectiveness Analysis (FMEA) table that tracks and analyzes production line failure.

The Florida company bases its analysis on identified ISO 9000 standards for quality control of all production line task rates. In both instances, management mandates the use of both analysis tools and production standards and the degree to which they are actually used in practice varies considerably.

Degrees of variance relate to the employee's understanding of the necessity to use such tools, their perception of value in using them, and the inherent motivation accorded the employee. Courses on how to use the management tools were unsuccessful. During formal classes offered as to how to use the tools, it was found both management and production line employees did not understand them.

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A Potential Solution

In both companies, employee training as a possible solution the problem was addressed. It was felt that if sufficient training could be provided, the management tools already in place would be used.

The Taiwan organization has been provided with a curricular plan based on a new instructional design model devised by the lead author through a series of formulae and matrices that, once training elements are identified, provide management with a specific action plan.

The Florida organization began its training analysis by first looking at its workforce demographics and capabilities. A first step was the provision of basic communication and mathematic skills for the line-workers, thus the beginning of *"Project Gold"*.

Issues from the East

This project focused on updating training needs and building a web based learning support system. A year after the system was adapted in this manufacturing company a reduction was found the number of employees who participated in web-based training. Each employee is required to take at least take one course via web based training but many finally quit learning from the web.

An interview and survey was conducted about the web based training issues from employee and management. It was found that employees are willing to participate in web training courses, the Internet access is good, and each course is well designed. The connection between courses was the problem. For example, in the quality control class, learners did not have the requisite statistics back ground to successfully complete the class. When the employees enrolled in the quality control class, there was no English class provided to assist learners in reading the English menu or to operate machines that have English control panels.

Finding the training needs

The worker-oriented, job-oriented, and cognitive task analyses were performed as tools for determining the required skills, knowledge, and abilities of employees to accomplish the required tasks and for developing the training curriculum.

Worker-oriented Task Analysis

The purpose of the worker-oriented task analysis is to determine the knowledge and skills of employees. The process of worker-oriented task analysis includes interviews and discussions with employees, job tasks performance observations, review of tasks by management, and surveys to specify the knowledge and skills needed for accomplishing tasks (Clifford 1994).

Job-oriented Task Analysis

Job-oriented task analysis is used to collect procedural knowledge related to specific tasks required for each job. This analysis relies on employees and supervisors who can clearly state the job task sequence step-by-step (Texas Higher Education Coordinating Board 1995).

Cognitive Task Analysis

Cognitive task analysis involves observation and worker interviews and is a process used to gather information on worker behavior in problem solving (Llorente 1996).

The second focus of the project was building a web based learning support system that constructs a cognitive map to depict the amount of training needed. The training offered on the web contains approximately 2000 courses such as statistical process control, quality control tools, and specialized problem-solving skills and skill required for machine operations. The "map" is able to help learners to obtain direction as to the large number of courses, and shows both the pre-requisite and advanced courses.

The core principle of the learning support system

The learning support system employs characteristics found in our Interpretive Structure Model. "The Tangible product of an Interpretive Structure Model exercise is a structural model called a "map" which is, in general, a multilevel structure. In condensed form, the structure is a hierarchy" (Warfield, 1977). From the cognitive map learners have a visualized concept that shows the course structure and the hierarchy of courses, thus enabling learners to track their learning path and direction without getting lost. The following information illustrates the core principles that allow the computer to automatically develop the graphic structure of training courses.

Step one: Determine the training needs.

From the figure 1, the "1" represents the specific department and the following 1.1, 1.2, 1.3, 1.4 numbers represent the four assembling lines under department "1". Training needs determined through worker, job, and cognitive task analyses, are depicted as Q_1, Q_2, Q_3...Q_{ijk} as shown in figure 1.

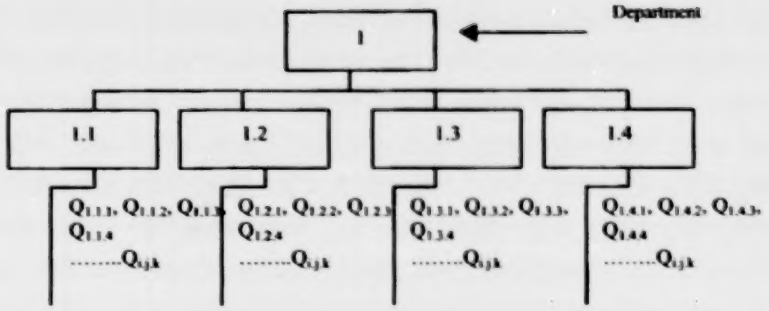

Fig. 1. Needs assessment

Step two: Forming the system matrix

This step compares every course or learning objective with every other course or learning objective in the matrix to identify any subordinate relationships. When completed, a system matrix that embodies the subordinate relationships between and among the courses and learning objectives is the result.

No.	Course Course	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Q1						?								
2	Q2	?					?								
3	Q3	?	?		?		?		?						
4	Q4	?	?				?					?			
5	Q5			?						?					
6	Q6														
7	Q7												?		
8	Q8			?		?				?					?
9	Q9										?		?		
10	Q10														?
11	Q11									?	?				?
12	Q12														
13	Q13									?					?
14	Q14									?	?		?		

Fig. 2. System matrices

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Step three: The rationalizing procedure. The system matrix is then transferred to connected matrices.

This step is intended to determine the number of system matrix hierarchies. The aim of the rationalizing procedure is to produce a set of matrices called *connected subordination matrices*, each of which represents one hierarchy.

$$A = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 1 & 0 & 0 \end{bmatrix}$$

Step four: Transfer connected matrices to reachable matrix

Definition $B = A + I$

Where A = Connected matrices

I = Identity matrices

[Boolean factor]

0+0=0 0x0=0

0+1=1 0x1=0

1+0=1 1x0=0

1+1=1 1x1=1

reachable matrix

$B.B....B^{n-1}=B^n$

reachable matrix: $T = B^n$

[Generating matrix]

$$\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix} \times \begin{bmatrix} a' & b' \\ c' & d' \\ e' & f' \end{bmatrix} = \begin{bmatrix} a \cdot a' \oplus b \cdot c' \oplus c \cdot e' & a \cdot b' \oplus b \cdot d' \oplus c \cdot f' \\ d \cdot a' \oplus e \cdot c' \oplus f \cdot e' & d \cdot b' \oplus e \cdot d' \oplus f \cdot f' \\ g \cdot a' \oplus h \cdot c' \oplus i \cdot e' & g \cdot b' \oplus h \cdot d' \oplus i \cdot f' \end{bmatrix}$$

Generating matrix

$$B = A + I = \begin{bmatrix} 0&0&0&0&0&1&0&0&0&0&0&0&0&0 \\ 1&0&0&0&0&1&0&0&0&0&0&0&0&0 \\ 1&1&0&1&0&1&0&1&0&0&0&0&0&0 \\ 1&1&0&0&0&1&0&0&0&0&1&0&0&0 \\ 0&0&1&0&0&0&0&0&1&0&0&0&0&0 \\ 0&0&0&0&0&0&0&0&0&0&0&0&0&0 \\ 0&0&0&0&0&0&0&0&0&0&0&1&0&0 \\ 0&0&1&0&1&0&0&0&1&0&0&0&0&1 \\ 0&0&0&0&0&0&0&0&0&1&0&1&0&0 \\ 0&0&0&0&0&0&0&0&0&0&0&0&0&1 \\ 0&0&0&0&0&0&0&0&0&1&1&0&0&1 \\ 0&0&0&0&0&0&0&0&0&0&0&0&0&0 \\ 0&0&0&0&0&0&0&0&0&1&0&0&0&1 \\ 0&0&0&0&0&0&0&0&0&0&0&1&0&0 \end{bmatrix} + \begin{bmatrix} 1&0&0&0&0&0&0&0&0&0&0&0&0&0 \\ 0&1&0&0&0&0&0&0&0&0&0&0&0&0 \\ 0&0&1&0&0&0&0&0&0&0&0&0&0&0 \\ 0&0&0&1&0&0&0&0&0&0&0&0&0&0 \\ 0&0&0&0&1&0&0&0&0&0&0&0&0&0 \\ 0&0&0&0&0&1&0&0&0&0&0&0&0&0 \\ 0&0&0&0&0&0&1&0&0&0&0&0&0&0 \\ 0&0&0&0&0&0&0&1&0&0&0&0&0&0 \\ 0&0&0&0&0&0&0&0&1&0&0&0&0&0 \\ 0&0&0&0&0&0&0&0&0&1&0&0&0&0 \\ 0&0&0&0&0&0&0&0&0&0&1&0&0&0 \\ 0&0&0&0&0&0&0&0&0&0&0&1&0&0 \\ 0&0&0&0&0&0&0&0&0&0&0&0&1&0 \\ 0&0&0&0&0&0&0&0&0&0&0&0&0&1 \end{bmatrix}$$

$$= \begin{bmatrix} 1&0&0&0&0&1&0&0&0&0&0&0&0&0 \\ 1&1&0&0&0&1&0&0&0&0&0&0&0&0 \\ 1&1&1&1&0&1&0&1&0&0&0&0&0&0 \\ 1&1&0&1&0&1&0&0&0&0&1&0&0&0 \\ 0&0&1&0&1&0&0&0&1&0&0&0&0&0 \\ 0&0&0&0&0&1&0&0&0&0&0&0&0&0 \\ 0&0&0&0&0&0&1&0&0&0&0&1&0&0 \\ 0&0&1&0&1&0&0&1&1&0&0&0&0&1 \\ 0&0&0&0&0&0&0&0&1&1&0&0&0&0 \\ 0&0&0&0&0&0&0&0&0&1&0&0&0&1 \\ 0&0&0&0&0&0&0&0&1&1&1&0&0&1 \\ 0&0&0&0&0&0&0&0&0&0&0&1&0&0 \\ 0&0&0&0&0&0&0&0&1&0&0&0&1&1 \\ 0&0&0&0&0&0&0&0&1&1&0&1&0&1 \end{bmatrix}$$

$$B^S = B \times B = \begin{bmatrix} 1&0&0&0&0&1&0&0&0&0&0&0&0&0 \\ 1&1&0&0&0&1&0&0&0&0&0&0&0&0 \\ 1&1&1&1&1&1&1&0&1&1&1&1&1&0&1 \\ 1&1&0&1&0&1&0&0&1&1&1&1&0&1 \\ 1&1&1&1&1&1&1&0&1&1&1&1&1&0&1 \\ 0&0&0&0&0&1&0&0&0&0&0&0&0&0 \\ 0&0&0&0&0&0&1&0&0&0&0&1&0&0 \\ 1&1&1&1&1&1&1&0&1&1&1&1&1&0&1 \\ 0&0&0&0&0&0&0&0&0&1&1&0&1&0&1 \\ 0&0&0&0&0&0&0&0&0&1&1&0&1&0&1 \\ 0&0&0&0&0&0&0&0&0&1&1&1&1&0&1 \\ 0&0&0&0&0&0&0&0&0&0&0&0&1&0&0 \\ 0&0&0&0&0&0&0&0&0&1&1&0&1&1&1 \\ 0&0&0&0&0&0&0&0&0&1&1&0&1&0&1 \end{bmatrix} = T \text{ (reachable matrix)}$$

Step five: Transform reachable matrix to hierarchical matrix

[Definition]

s_i the number of the element

$R(s_i)$ reachable set

$Q(s_i$

$R(s_i$ $Q(s_i$

[Example]

$s_i = 1$

$R(s_i$: 1 6

$Q(s_i$: 1 2 3 4 5 8

$R(s_i \cap Q(s_i)$: 1

	s_i	$R(s_i)$	$Q(s_i)$	$R(s_i) \cap Q(s_i)$
Level1	1	1 6	1 2 3 4 5 8	1
T	2	1 2 6	2 3 4 5 8	2
	3	1 2 3 4 5 6 8 9 10 11 12 14	3 5 8	3 5 8
	4	1 2 4 6 9 10 11 12 14	3 4 5 8	4
	5	1 2 3 4 5 6 8 9 10 11 12 14	3 5 8	3 5 8
	6	6	1 2 3 4 5 6 8	6
	7	7 12	7	7
	8	1 2 3 4 5 6 8 9 10 11 12 14	3 5 8	3 5 8
	9	9 10 12 14	3 4 5 8 9 10 11 13 14	9 10 14
	10	9 10 12 14	3 4 5 8 9 10 11 13 14	9 10 14
	11	9 10 11 12 14	3 4 5 8 11	11
	12	12	3 4 5 7 8 9 10 11 12 13 14	12
	13	9 10 12 13 14	13	13
	14	9 10 12 14	3 4 5 8 9 10 11 13 14	9 10 14
Level2	1	1	1 2 3 4 5 8	1
T'	2	1 2	2 3 4 5 8	2
	3	1 2 3 4 5 8 9 10 11 14	3 5 8	3 5 8
	4	1 2 4 9 10 11 14	3 4 5 8	4
	5	1 2 3 4 5 8 9 10 11 14	3 5 8	3 5 8
	7	7	7	7
	8	1 2 3 4 5 8 9 10 11 14	3 5 8	3 5 8
	9	9 10 14	3 4 5 8 9 10 11 13 14	9 10 14
	10	9 10 14	3 4 5 8 9 10 11 13 14	9 10 14
	11	9 10 11 14	3 4 5 8 11	11
	13	9 10 13 14	13	13
	14	9 10 14	3 4 5 8 9 10 11 13 14	9 10 14
Level 3	2	2	2 3 4 5 8	2
T'	3	2 3 4 5 8 11	3 5 8	3 5 8
	4	2 4 11	3 4 5 8	4
	5	2 3 4 5 8 11	3 5 8	3 5 8
	8	2 3 4 5 8 11	3 5 8	3 5 8
	11	11	3 4 5 8 11	11
	13	13	13	13
Level 4	3	3 5 8	3 5 8	3 5 8
T''	4	4	3 4 5 8	4
	5	3 4 5 8	3 5 8	3 5 8
	8	3 4 5 8	3 5 8	3 5 8
Level 5	3	3 5 8	3 5 8	3 5 8
T	5	3 5 8	3 5 8	3 5 8
	8	3 5 8	3 5 8	3 5 8

Fig. 3. Hierarchy Analysis

Step six: Transform the hierarchy matrix to the Interpretive Structure Model

In this step the task is to produce a cognitive map and graphic hierarchy structure among courses or learning objectives. After this step, the "map" automatically generates by computer and is displayed on the web page. Learners will have a visualized concept on the course structure and the hierarchy of the course and be able to track their learning path and direction without getting lost.

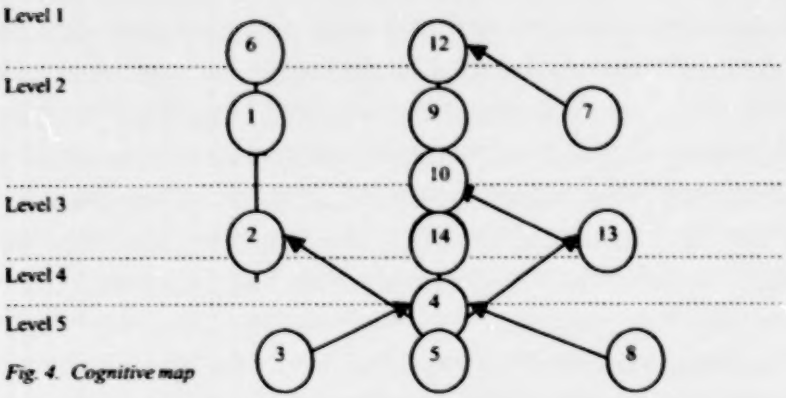

Fig. 4. Cognitive map

Issues from the West

The global corporate climate in which American businesses find themselves competing today requires a high workplace rich in skills and technology. Today's manufacturing workforce requires continual training to keep abreast of technological advances. Today's corporations need flexible people, trained in many different functions (specialized training with cross training).

Technology waits for no one! It is progressing at warp speed, and workers (especially production workers) are hard pressed to keep up. Multinational manufacturing companies are working toward gaining or retaining global standardization of product quality (ISO 9000,QS 9000, etc). What happens to a worker with low basic skills and an inability to train rapidly enough to keep pace with these changes? They are lost during downsizing or merger. It is usually the least educated workers in low-end manufacturing jobs that become unemployed first and remain so for the longest amount of time. While many people consider the 1990-1991 recession to have been the first white-collar one, it hit minorities and low-skilled workers especially hard. They ended up getting clobbered and the least educated employees got clobbered once again. (Hilsenrath, September 2001)

A survey by the Gallup Organization for the National Federation of Independent Business found that two-thirds of companies of the 260 polled said they have gone without needed skilled employees. More than half said they had to cut work hours, limit production or turn away business. Many companies have told researchers that the softening market now allows them to be more selective in hiring than they were last year. (Grimsley, August 2001) Most organizations agree that letting less-productive workers go and replacing them with better-skilled ones during a time of economic crisis is an opportunity they are quick to use to their advantage. Current employees are increasingly aware of this situation.

Management Plays a Vital Role In Training

Management plays a vital role in for it sets the tone when it comes to employee training and professional development. Management teams of many American companies have already begun to align their training programs with the company goals and to follow the human resource management practice continuums. They are attempting to progress from short to long-term term focus, from narrow to broad application, from a productivity emphasis to quality of work life emphasis, from spontaneous, unplanned training to a planned, systematic one, from individual orientation to group orientation, from low participation to high participation and from zero employee involvement to a higher degree of involvement. (Evans & Lindsay, 1999, pp. 290-3)

In America companies, motivational focus is usually on rewards and recognition. They establish minimums for promoting cooperation, create or modify recognition systems, compensation systems, and mechanisms for broadening employee responsibilities. They create education and training opportunities for employees to learn and use skills that go beyond current job assignments through the redesigning process. They form relationships with educational institutions to continue to develop employees – thus, ensuring a supply of well-prepared employees. They actively seek employee involvement. However, depending on the type of management in the organization, the degree of employee involvement varies widely. The table below depicts levels of employee involvement. •

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Level	Action	Primary Outcome
1. Information sharing	Managers decide – then inform employees	Conformance
2. Dialogue	Managers get employee input - then decide	Acceptance
3. Special problem solving	Managers assign problem to specific employees	Contribution
4. Intragroup problem solving	Intact groups meet to solve it.	Commitment
5. Intergroup problem solving	Cross-functional groups solve problems	Cooperation
6. Focused problem solving	Intact groups deepen involvement in specific issue	Concentration
7. Limited self-direction	Teams function full time with Supervision	Accountability
8. Total self-direction	Executives facilitate self-management in All-team Company	Ownership

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Increased employee involvement results in empowered employees who have the wisdom to know what to do and when to do it, possessing both the right motivation and tools. This requires significant change in work systems within companies. Employees must be provided education, resources, and encouragement from management. However, empowerment also means that managers must be willing to relinquish some power. This power shift often creates fears in management that workers will abuse their privileges. Experience usually shows that front-line workers generally are more conservative than their managers. (Evans & Lindsay, 1999, pp. 290-3)

Experience has shown that feedback to management is vital from the facilitator or educational institute providing the training. With computer-assisted instruction and e-learning, this task is easier because monthly reports on employee training progress (generic progress – all names and vital information are omitted) can be sent to management on a regular basis.

Employee Motivation Plays an Important Role in Training Programs

Students in basic skills updating training programs report an immediate boost in self-esteem. As they set and meet goals, it is not long until a habit is formed and transferred to their own lives in the workplace and at home. Facilitators report comments such as, from an older student, "I enjoy coming to class because it helps me stay more mentally alert". Students realize that they get increased respect at home because they are now able to help their children with their homework. Supervisors report seeing an increased confidence and professional development focus that soon becomes an incentive to volunteer for additional training or responsibilities. Motivation for specific skill training is easier to generate because once employees comprehend "what's in it for them" they are excited about learning.

In order to motivate employees and managers of an organization, trainers or facilitators must establish a sound professional relationship with the company management and patiently attempt to spark the interest of the workers. Listening and being sensitive to their needs can aid in this task. If it is a manufacturing firm, understand that downtime is money lost. Being open to creative scheduling can be a big help – both for meetings with management and classes. Motivational flyers and pamphlets can be produced and strategically placed around the plant and open houses can be held with specific times set aside for questions and answers.

Examples of Successful Training Programs

In 1993, American production workers found that without continual training, they were unable to adequately meet the challenges of rapidly progressing technology, global competition, and corporate mergers. *Project Gold* was a three-year Federal Workplace Education Grant aimed at these production workers. Collaborative partnerships arose between a community college, a private non-profit organization, and a mid-size telecommunications equipment manufacturing plant in Central Florida. This project was only a small part of a nationwide collaborative effort to assist companies in addressing a lack of American global competitiveness.

This project was unique in that it had a dual focus: One part was a computer-assisted instructional learning center to update or enhance basic skills. In this center, PLATO and *I Speak English* software was used: PLATO for the basic skills, as well as for some specialized problem-solving skills such as Statistical Process Control (SPC) and *I Speak English* for the English as a second language students (ESL). Another example of training received in the learning center was GRE preparation. A residual benefit to *Project Gold* was that all of these students become quite skilled at working on computers. This was a plus that the company had not considered.

The procedure was the following:

1. Students would enter and receive the Test of Adult Basic Education (TABE) in order to assess their basic skill levels.
2. PLATO would draw up an individualized education plan (IEP) for each based on their specific needs.
3. They would then commence their self-paced training with regular progress reports being generated – which proved to be very motivational to the students, as well as to management.
4. On-the-job follow-ups were then carried out, as meetings were set up with management to discuss visible results.

The second focus of the project was on customized training geared specifically to meet industry needs. First, a certified job profiler conducted a job analysis though interviews, surveys, plant tours, and meetings with subject matter experts (SME's) and task analysis. A customized curriculum was created and methods and strategies selected, as well as securing the best media, materials, and instructor. Finally, creative scheduling was undertaken. Given that timing is everything in manufacturing, we worked closely with management in designing a training program that would not cause undue scheduling stress. Some examples of customized training offered in this project were Bright Ideas (creative problem solving), American Production and Inventory Control Society (APICS I & II), Statistical Process Control (SPC), teamwork, Regular Problem Solving, HAZCOM, and New Technology Training.

A second collaborative program was being conducted simultaneously with Project Gold. It was the *Electronic Technology Advanced Program (ETAP)* that involved a partnership with the manufacturing plant, the public school system, and a community college.

ETAP was a dual system combining theory with practice that originated in Germany a hundred years ago. It begins with basic skills and knowledge and progresses to a highly technical level. The *ETAP* program includes a "Pre apprenticeship" program for high school students that were tied to the "Tech Prep" initiative. The second was an apprenticeship program for community college students to obtain an Associates of Science Degree in Electronic Engineering Technology, an electronic industry certification, and Government Certification.

ETAP was designed to search find qualified, highly motivated high school students, and offer them a scholarship and hands-on applied training. Then upon graduation, accept them into the actual program where they would then be paid for two On-the-job-training periods and receive tuition and fee reimbursement for a two-year Associate Degree – all of this with the ultimate goal of employment within this company. The program would enable students/employees to compete using globally benchmarked world-class standards with recognized credentials, train in critical manufacturing technologies and customer service, and train an incumbent new work force, existing workforce, and instructors/mentors.

Virtual Universities

Today the world is rapidly turning toward electronic learning. Virtual universities are popping up everywhere: Florida, California, Kentucky, New Jersey, Israel, Germany, and Canada to name a few. The manufacturing plant where the two above-mentioned programs operated also has a virtual university. Employees can be motivated to learn if they understand that it will possibly increase job security. It was proven with *Project Gold* and the ETAP program successfully proved this concept in our high schools and community colleges. *ETAP* is now called *ACE-NET* involving the same partnership but now it leads to an AS degree in Computer Engineering Technology.

This educational history of this manufacturing company has led up to the E-learning that is now taking place. Workers can still attend the basic skill updating classes at the community college. However, today, this company has a *Virtual University* of its own. *Their goal during 2001 is to convert at least 60 % of all training programs to either Computer Assisted Instruction (CAI) or E Learning.* Next year, *the goal is for 75% and finally 100% in 2003*! Thus, as is readily apparent – *Technology* marches on!

Conclusions

We have examined two organizations, one in the east, a second in the west. Both faced training issues that impacted line-employees where communication and work-related skill assessment and development were key to their future success. Management issues accompanied the decisions as to what training needs were and the basis upon which such decisions would be made. Despite being separated by oceans and miles, the problems encountered were identical while the proposed solutions differed only in their complexity. Both solutions were designed to achieve success on the part of all, with quality control being the common element. The progress made in the Florida scenario paid off with results that not only are being continued, albeit in another location, but amplified within the organization as well. The jury remains out in the instance of the Taiwanese manufacturing plant until sufficient time elapses to test the model as proposed.

As has often been concluded in the past, while cultures may differ, the basic issues related to e-learning, training as a whole, and employee demographics are often far more alike than different. This, we feel, is an accurate reflection of today's rapidly advancing techno-economy.

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